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THE EFFECT OF CATTLE AND BIG GAME GRAZING ON A PONDEROSA PINE PLANTATION

by

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ABSTRACT

Mixed conifer stands that have been clearcut, planted with trees, and seeded to grass are a potential source of summer forage for livestock and wildlife. Heights of planted trees in portions of a clearcut that had been ungrazed, grazed only by deer and elk, and by deer, elk, and cattle were compared. After five growing seasons, grazing had neither greatly harmed nor benefited growth and survival of the trees in the plantation.

Keywords: Grazing land, range management, forest clearcutting, ponderosa pine.

INTRODUCTION

The densely timbered mixed conifer forests of northeastern Oregon and southeastern Washington have long been considered important summer habitat for deer and elk but nearly unusable range for domestic livestock (Pickford and Reid 1948). However, in the last 10 years, timber harvests have drastically changed the forest environment. Many small stands have been clearcut, planted with trees, and seeded to grass to protect the disturbed soil. These sites are a potential source of summer forage for domestic livestock as well as wildlife while the new forest develops.

Presently, few clearcuts are grazed by livestock. Foresters are understandably reluctant to allow grazing before adequate management information is available to assure that grazing can be compatibly coordinated with the primary management goal--reforestation.

In 1965, a study of plant succession and animal use after logging was initiated in the mixed conifer forest type. One of the study sites was a clearcut that had been planted with young ponderosa pine (*Pinus ponderosa*)[1] and seeded to grass. It was one of the few areas grazed by cattle as well as deer and elk. To interpret the effects of combinations of use by these animals, we constructed a series of exclosures. This note reports the early growth and survival of the planted pines in those areas receiving different grazing use.

STUDY AREA AND METHODS

The study area was a 39-acre clearcut unit located approximately 12 miles west of Troy, Oregon, on the Umatilla National Forest. Elevation is 4,000 feet, and annual precipitation is estimated to be 30-40 inches, mainly from winter snows and spring and fall rains. Deep, well-drained soils have developed from wind-deposited volcanic ash. Adjacent unlogged stands are dominated by grand fir (*Abies grandis*), with lesser amounts of western larch (*Larix occidentalis*), Douglas-fir (*Pseudotsuga menziesii*), Engelmann spruce (*Picea engelmannii*), lodgepole pine (*Pinus contorta*), and occasional ponderosa pine. Measurements of height and age of the dominant grand fir indicate average site index class IV.[2] The understory is dominated by big huckleberry (*Vaccinium membranaceum*). Several other low shrubs, many shade-tolerant forbs, and occasional sedges and grasses are also present.

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[1] Sources for scientific nomenclature are Little (1953), Hitchcock et al. (1955), and Ingles (1965).

[2] Determined from site quality curves for Douglas-fir in McArdle, Meyer and Bruce (rev. 1961).

The area is summer range for big game and cattle. Moderate numbers of Rocky Mountain elk (*Cervus canadensis nelsoni*) and mule deer (*Odocoileus hemionus hemionus*), and a few white-tailed deer (*Odocoileus virginianus ochrourus*) are present from May through November. Cattle (cows and calves) are permitted to graze from early June through late July.

The unit was clearcut in 1963-64 which left cull logs and slash on the ground. In the fall of 1964, timothy (*Phleum pratense*) was seeded aerially at the rate of 0.5 pound per acre to quickly establish a ground cover on the highly disturbed soil. The following May (1965), 2-0 ponderosa pine nursery stock were hand planted at approximately a 10- by 10-foot spacing.

During the summer of 1965, 2-acre exclosures were constructed on gentle northwest- and southeast-facing slopes formed by the small drainage bisecting the unit. Deer and elk easily crossed the fences and used these areas, but cattle were excluded. Contiguous unfenced study sites were accessible to all grazing animals. Later, at the start of the 1966 grazing season, an adjacent portion of the southeast-facing slope was fenced from cattle, deer, and elk use.

In November 1967, 48 planted pines were selected for study in each of five grazing situations. Regularly spaced points were established along transects randomly located parallel to the slope contour. The tree nearest each point, regardless of size or apparent vigor, was tagged. At that time, the trees had been subject to grazing for three seasons. In November 1969, the end of the fifth season after planting, total height and damage due to needle browsing, bud breakage, trampling, and girdling were noted. When possible, causes of tree mortality were determined. The growth and survival of these trees will be followed through their 10th growing season and longer if warranted.

Supplemental information on animal use and foliage cover of competing shrubby and herbaceous plant species was estimated on permanently marked plots in August 1969. Cover was estimated by a method modified after that of Daubenmire (1959). Forage use was expressed as a percentage of the forage volume available before use.

RESULTS AND DISCUSSION

Survival of the pine plantation has been good. A survey by National Forest personnel in the spring of 1969 indicated that approximately 87 percent of the unit was satisfactorily stocked with at least 250 trees per acre.

A new ground cover has also developed rapidly. Foliage cover of major plant groups is summarized for 1969 in table 1. Seeded timothy has become well established throughout

Table 1.--*Foliage cover of major plant classes after five growing seasons in a mixed conifer clearcut grazed by deer, elk, and cattle*

Grazing treatment	Foliage cover				
	Grasses and grasslike	Forbs	Shrubs	Trees	Total[1]
	- - - - - - - - - *Percent* - - - - - - - - - - -				
No grazing	29	51	24	1	105
Deer and elk	26	38	16	2	82
Deer, elk, and cattle	20	43	14	1	78

[1] Cover of layered canopies of different species can total more than 100 percent.

the unit. Many seral species have also invaded the site. Abundant forbs include willowweeds (*Epilobium* spp.), mountain thermopsis (*Thermopsis montanus*), bull thistle (*Cirsium vulgare*), and Canada milkvetch (*Astragalus canadensis mortoni*). The most common shrub is sticky currant (*Ribes viscosissimum*).

Experience elsewhere (Baron 1962) suggests that successful establishment of the plantation could be attributed to the fact that pines, grass, and seral species began growth at the same time. One might speculate that survival and growth would have been poor if the trees had been planted after the ground cover had become well established.

The abundance and variety of forage available in the clearcut attracted both big game and cattle. Forage use by cattle was much greater than that by deer and elk. They grazed on all accessible palatable forage outside the exclosures. By the close of the grazing season, the appearance of the area grazed by cattle contrasted sharply with the area grazed by deer and elk (figs. 1 and 2).

Cattle grazed almost all species, but timothy was eaten by far the most frequently. Utilization of timothy varied greatly according to accessibility of the forage. Plants growing along skid trails and in other open areas were heavily used, and those growing through slash or adjacent to cull logs were lightly used. Access to a few small areas of forage was completely blocked by slash and logs.

Signs of the presence of deer and elk such as tracks, pellets, and beds were found frequently both inside and outside the cattle fences. However, forage use in the areas accessible only to big game was scattered and, when averaged, was relatively light. Canada milkvetch was most heavily used. Timothy was rarely eaten resulting in a dense layer of grass litter over the ground surface.

The planted pines were browsed lightly in each of the grazing situations. Nearly 30 percent of the pines showed evidence of browsing in 1967; 10 percent, in 1969. Usually only the tips of a few needles were clipped, but occasionally terminal buds were broken off causing laterals to assume dominance. The latter kind of damage was found most often along heavily traveled skid trails and resulted more frequently from trampling than browsing. Because of the heavy grass cover, some damage probably occurred while the cattle were grazing other plants.

Grazing damage was light because the grazing season was properly timed. By the time animals began to graze in late spring, an abundance of preferred herbaceous forage had already developed. Likewise, the cattle were removed by midsummer before forage was depleted or had become coarse and relatively unpalatable. Thus, they were not forced to graze less palatable vegetation, including the young pines.

Twenty-one (about 9 percent) of the 240 trees tagged died during the

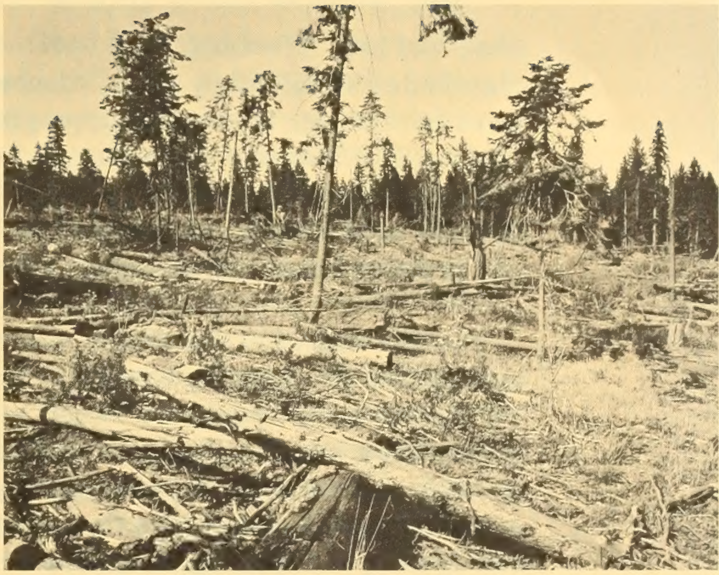

Figure 1.--A portion of the clearcut grazed by deer, elk, and cattle.

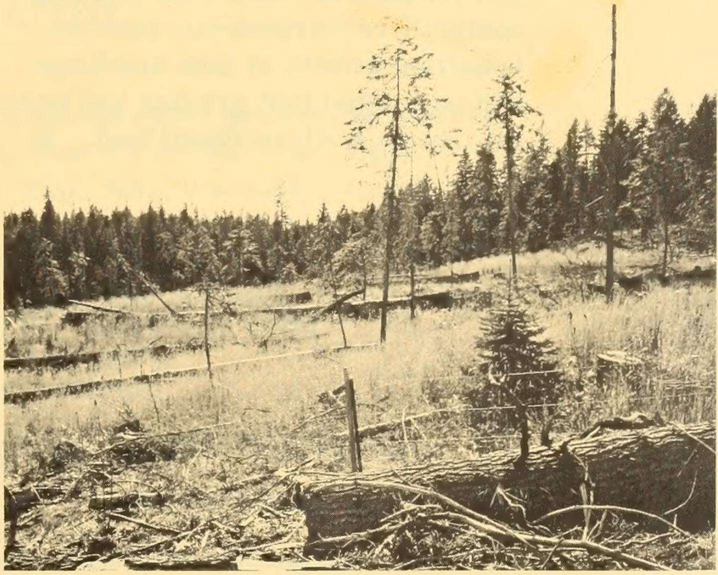

Figure 2.--A portion of the clearcut grazed only by deer and elk. Note the abundance of ungrazed timothy. This area adjoins the area shown in figure 1.

study period. Mortality was well distributed in the study area. Causes were trampling, 5 percent; porcupine (*Erithizon dorsatum*) girdling, 14 percent; gopher (*Thomomys* sp.) damage to the roots, 48 percent; and undetermined, 33 percent.

At the outset of the study, we anticipated that grazing a portion of the herbaceous vegetation might appreciably increase the availability of light, nutrients, and particularly, soil moisture for tree growth. Pearson (1942), Larson and Schubert (1969), and others have demonstrated that complete removal of herbaceous competition resulted in increased survival and growth of trees. Pearson (1942) also found that clipping competitive herbaceous species benefited growth of pine seedlings and suggested that grazing had possibilities as a silvicultural tool. In western Oregon, Hedrick and Keniston (1966) reported that carefully controlled grazing conserved soil moisture, thereby influencing the growth of planted Douglas-fir.

Despite this evidence, average tree heights (table 2) indicated that grazing had not greatly benefited growth of this plantation after five growing seasons. Perhaps competition for soil moisture was not a factor limiting growth either because of the high soil moisture retention and availability characteristic of deep volcanic ash soils (Pumphrey 1971) or because the trees were able to develop deeper root systems than the grass before the grass became well established.

The effects of grazing might have been more pronounced if the cull logs and slash had been piled or burned to

Table 2.--*Height of planted ponderosa pine after five growing seasons in a mixed conifer clearcut grazed by deer, elk, and cattle*

Grazing treatment	Number of trees measured	Average height	Standard error
		- - - - *Inches*	- - - -
No grazing	43	27.8	±1.2
Deer and elk	90	28.7	±0.9
Deer, elk, cattle	86	30.6	±1.0

allow more uniform grazing. Slash restricted movements of grazing animals and growth of forage. The variable pattern of use may have masked somewhat the benefits expected. Yet, in areas where grazing cannot be carefully controlled, slash could safeguard plantations against excessive trampling and browsing from overgrazing or improper season of use.

Grazing experiments by other investigators are underway in mixed conifer clearcuts in which the slash has been burned. Their results should yield additional information about relationships between slash disposal, pattern of grazing, and plantation damage.

Results of this study suggest that summer grazing by deer, elk, and cattle can be compatible with reforestation practices in mixed conifer clearcuts in northeastern Oregon and southeastern Washington. Under proper management, which gives due consideration to season of use and stocking rate, cattle prefer forage little used by deer and elk and otherwise wasted. Duration of the forage supply cannot yet be predicted, but studies in progress and being planned should provide information about the use of fertilizers and other forage plants to maximize forage production for both wildlife and cattle while the new forest develops.

LITERATURE CITED

Baron, Frank J.
1962. Effects of different grasses on ponderosa pine seedling establishment. USDA Forest Serv. Res. Note PSW-199, 8 p., illus. Pac. Southwest Forest & Range Exp. Sta., Berkeley, Calif.

Daubenmire, R.
1959. A canopy-coverage method of vegetational analysis. Northwest Sci. 33(1): 43-64.

Hedrick, D. W., and R. F. Keniston.
1966. Grazing and Douglas-fir growth in the Oregon white-oak type. J. Forest. 64: 735-738, illus.

Hitchcock, C. L., A. Cronquist, M. Ownbey, and J. W. Thompson.
1955. Vascular plants of the Pacific Northwest. 5 vols. Seattle: Univ. Wash. Press.

Ingles, Lloyd G.
1965. Mammals of the Pacific States: California, Oregon, and Washington. 506 p. Stanford, Calif.: Stanford Univ. Press.

Larson, M. M., and Gilbert H. Schubert.
1969. Root competition between ponderosa pine seedlings and grass. USDA Forest Serv. Res. Pap. RM-54, 12 p., illus. Rocky Mountain Forest & Range Exp. Sta., Fort Collins, Colo.

Little, E. L., Jr.
1953. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dep. Agr. Agr. Handb. 41, 472 p. Washington, D.C.

McArdle, Richard E., Walter H. Meyer, and Donald Bruce.
1961. The yield of Douglas-fir in the Pacific Northwest. (Rev.) USDA Forest Serv. Tech. Bull. 201, 74 p., illus. Washington, D.C.

Pearson, G. A.
1942. Herbaceous vegetation: a factor in natural regeneration of ponderosa pine in the southwest. Ecol. Monogr. 12: 315-338, illus.

Pickford, G. D., and Elbert H. Reid.
1948. Forage utilization on summer cattle ranges in eastern Oregon. U.S. Dep. Agr. Circ. 796, 27 p., illus. Washington, D.C.

Pumphrey, F. V.
1971. Grass species growth on a volcanic ash-derived soil cleared of forest. J. Range Manage. 24: 200-203.

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